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Beyond fear: Opportunities and positive use of ICT among children and adolescents

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ABSTRACT

This study aimed to understand the advantages of digital connectivity in children and teenagers up to 18 years. Utilizing the PRISMA protocol, a decade's worth of literature was reviewed, analyzing 128 articles from WOS and Scopus databases. The research highlighted five key areas where digital connectivity can exert a positive impact on children: 1) Entertainment, information, and communication; 2) Emotional and social development; 3) Healthy lifestyle; 4) Citizen participation; and 5) education. Recent trends show a rise in studies related to education and training, mainly employing qualitative methods, and predominantly focusing on European adolescents (12 to 18). The research's goal is to understand which are the salient trends on recent academic research on potential benefits of ICT among children and teenagers, especially in vulnerable populations, and advocate for media literacy that promotes critical thinking, content creation, values, and helps combating disinformation.

Keywords: *opportunities, connectivity, Internet, children, adolescence*.

INTRODUCTION

Research around digital connectivity in the children and youth population has taken a comprehensive approach that seeks to discern both the opportunities and associated negative aspects. It has been proved that digital connectivity itself does not generate risks, but rather it is up to usage and personal values to turn it into a threat or an opportunity (Byrne & Burton, 2017). This requires generating processes that protect the digital rights of users and, at the same time, take advantage of the opportunities of digital spaces (Brites & Castro, 2022). The emphasis placed on these issues is well illustrated by the current political agenda through the European Union Strategy (2021) on the Rights of the Child 2021-2024, highlighting, as one of its actions, that of working for "an EU where children can navigate the digital environment and harness its opportunities" (p.17). Along the same lines, we find The Rewired Global Declaration on Connectivity for Education launched by the UNESCO (2021), which emphasizes the importance of reducing the digital divide and establishing a new balance with technology, through approaches that take advantage of its educational and social value, while ensuring protection in digital environments.

The advent of the twenty-first century witnessed the emergence of the first international surveys regarding early learners' utilization of digital technology. At this nascent stage, the term "technology" was exclusive to computers, which were regarded merely as auxiliary tools within the sphere of educational practice (Plowman & Stephen, 2003; Yelland & Masters, 2007). After this, the exploration of children's digital connectivity has stirred an unwavering, cross-disciplinary interest spanning various domains of knowledge. Orben's study in 2020 stands out, in which 80 systematic reviews and meta-analyses were scrutinized. This study inferred that the primary focus of these reviews had been on the inappropriate use of digital technologies and their impact on children's well-being. The COVID-19 pandemic catalyzed a notable surge in research studies delving into digital connectivity, with a particular emphasis on its influence within the educational landscape of young individuals (Marimon-Martí et al., 2022).

Within the realm of scholarly literature, several domains have been pinpointed that facilitate the leverage of digital connectivity during childhood and adolescence. Mantilla and Edwards (2019) provide an overview that highlights social interactions, digital recreation, and the educational journey, as significant arenas for the beneficial application of digital connectivity.

Friendships among peers significantly shape the psychosocial growth and welfare of young individuals. The advent of technology and social media has revolutionized the dynamics of these relationships in the younger demographic (Nesi et al., 2018). Consistent engagement with social media platforms augments social interaction, enhances communication, and deepens emotional bonds (Gordo-López et al., 2018). Digital communication fortifies pre-existing relationships and eases the formation of new associations with like-minded individuals. Additionally, social media encourages the exchange of cross-cultural ideas, bridging the accessibility gap and geographical distance in the realm of socialization (Hou et al., 2015).

Technological progression has led to an upsurge in device usage and internet access during leisure periods, particularly amongst the youth (Tham, 2019). This development has reshaped diverse entertainment modes including engagement on messaging platforms, social media networks, and email; exploration of information on the internet; consumption of audiovisual content; indulgence in video gaming; music playback; and the acquisition of skills for new applications (Rutherford et al., 2018).

Undheim's (2021) review addresses the implementation and integration of digital technology in pedagogical practice, including the use of digital educational games, learning with technology, and fostering digital creativity in children. Concurrently, other reviews scrutinize studies that focus on educationally-sound practices related to the proper utilization of digital connectivity. These include topics such as digital safety education (Walsh et al., 2022) and the employment of augmented reality to enhance learning experiences (Akçayır & Akçayır, 2017).

On the other hand, the technological structure of the virtual world allows for various forms of social interaction and Citizen participation, generating a dynamic social network (Andrade-Vargas et al., 2021). Digital platforms provide opportunities for social action and allow young people to be agents of change (Novella-Cámara et al., 2021).

Through the internet and social networks, it is possible for young people to disseminate information, mobilize people and push for social change. However, challenges arise in terms of attention and veracity of

information. In this context, media competence becomes relevant for citizen empowerment (Aguaded et al., 2022). Another advantage of the internet and digital platforms lies in their ability to furnish resources that inform, educate, and inspire young individuals to promote healthful environments. Websites, blogs, and health-centric portals offer valuable information regarding nutrition, physical activity, emotional well-being, and disease prevention (Gibson et al., 2017). Mobile health applications play a pivotal role in fostering healthy habits, while social networks serve as efficient conduits for disseminating health-promoting messages. However, it is essential to scrutinize the accuracy and reliability of such information (Wright et al., 2023).

When it comes to methodologies used for examining the utilization of digital technologies among children and adolescents, the review by Miller et al. (2017) reveals that a majority use descriptive and comparative designs, often resorting to homogenous samples that unfortunately overlook minority and/or disadvantaged groups. Livingstone et al. (2017) note that in terms of geographic context, these studies are primarily concentrated in high-income regions, such as Europe and the United States. However, they also highlight that the analysis of potential benefits rarely takes center stage in these investigations, with the emphasis leaning towards the application of specific educational technologies. As of now, there seems to be a dearth of comprehensive literature reviews encompassing studies on the opportunities and potentialities of digital connectivity among children and adolescents. This paper aims to shed light on this issue and examines the different research studies that gather interventions and analyses on the use of ICT among children and adolescents in which the scientific literature has demonstrated a positive impact.

METHOD

This article unveils data gleaned through an exhaustive literature review, adhering to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses[1]). This manual delineates the critical steps required to tackle specific research inquiries and steer the review process effectively (Page et al., 2021). It encapsulates aspects such as identification of information sources, establishment of inclusion and exclusion criteria, formulation of search strategies, selection of studies, data analysis, and structuring of results (Pati & Lorusso, 2017). Our aim is to scrutinize the most pertinent scientific literature regarding the benefits and opportunities offered by digital connectivity to children and adolescents. We structure our review around six Research fields: 1) thematic areas; 2) temporal range; 3) research methodology; 4) findings; 5) implications drawn from the studies; and 6) prospective research trajectories.

Phase 1: Research questions

The research questions are structured in Table 1 according to the six field previously described.

Table 1. *Research questions within the specified fields of study*

Research fields	Research questions
1.Thematic areas	RQ.1. Which thematic areas are explored in research focusing on the advantages of digital connectivity for children and adolescents?
2.Temporal range	RQ.2. How are the articles published between 2013 and May 2023 distributed?
3.Research methodology	RQ.3. What types of research designs are used? RQ.4. What is the age range of the participants involved in these studies? RQ.5. Is there any research that includes children and adolescents from vulnerable or underrepresented groups? RQ.6. In your case, to which of these groups do you belong? RQ.7. What is the geographical distribution of the studies?
4.Findings	RQ.8. What benefits derived from the use of ICT are mentioned as results of the studies?
5.Implications drawn from the studies	RQ.9. What implications are mentioned?

[1] https://www.prisma-statement.org/guidelines

6.Prospective research trajectories	RQ.10. What future lines of research are suggested?

Phase 2: Sources of information and eligibility criteria

The selection process focused exclusively on articles that addressed the opportunities, advantages, and benefits of digital connectivity where children and adolescents were the study's subjects. To locate these articles, comprehensive searches were conducted in two highly regarded databases: Web of Science (WOS) and Scopus.

The search criteria were fine-tuned to include only those articles that featured the key terms in the title, abstract, or as keywords. Moreover, only articles written in English or Spanish and available in open access format in the fields of Educational Sciences and Psychology in WOS or Social Sciences in Scopus were considered.

The search was confined to studies published within the last decade, specifically from January 2013 until May 2023.

Phase 3: Search strategies

For the search of the studies in the databases, the most used keywords in the scientific literature on this topic were established, considering the research questions. The following search equation was designed in both databases: ("benefit*" OR "advantag*" OR "appropriate use" OR "connectivity" OR "digital connection" OR "Internet" OR "digital environment*") AND ("child*" OR "teen*" OR "youth").

Phase 4: Selection process

The implementation of the eligibility criteria coupled with the search equation across both databases yielded 580 articles, of which 86 were duplicates appearing in both databases. After removing the duplicates, the remaining 249 articles were subjected to further scrutiny based on exclusion criteria: articles that did not focus on the benefits of digital connectivity and/or those in which the sample did not consist of children and adolescents. Following this exclusion process, a refined selection of 128 articles remained (Figure 1).

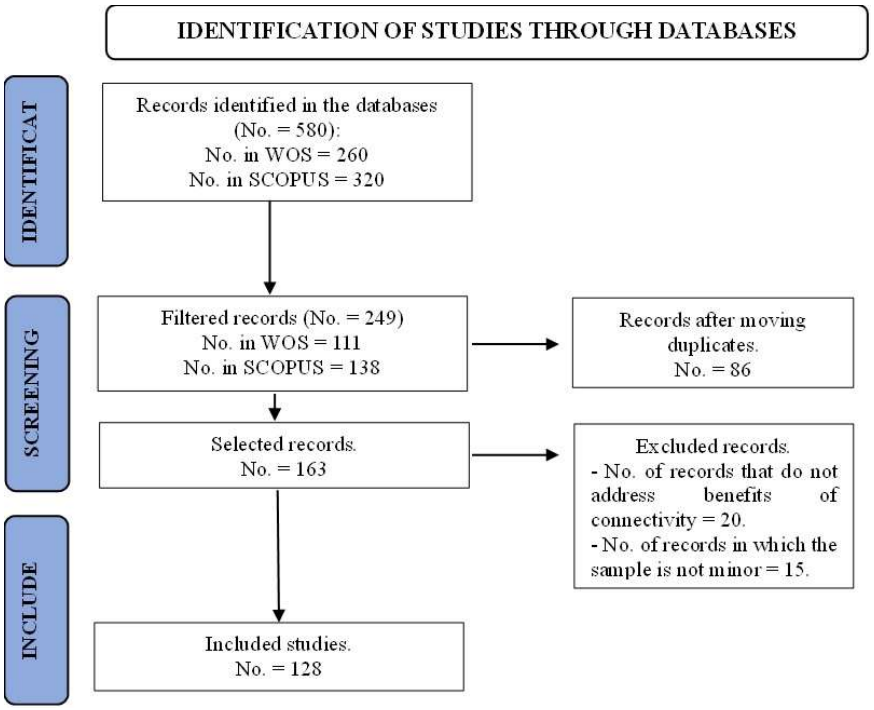

Figure 1. *PRISMA-Informed flowchart depicting the study selection process*

RESULTS

This section outlines the findings from our systematic literature review, categorized by the areas identified and corresponding research queries. The references of the 128 articles analyzed can be consulted online. Within the results section, we will reference certain studies related to each area, mindful of adhering to the article's length constraints.

Research field 1: Thematic areas

Five thematic areas were identified related to the benefits of digital connectivity among children and adolescents (RQ.1). As can be observed in Figure 2, there is a particularly present thematic nucleus, "Education", which brings together more than half of the studies analyzed (69). Followed in descending order, we find the development of "Citizen participation" (18), "Emotional and social development" using ICT (15), the benefits linked to "Entertainment, information and communication" (14), and to a lesser extent, the use of connectivity for a "Healthy lifestyle" (12).

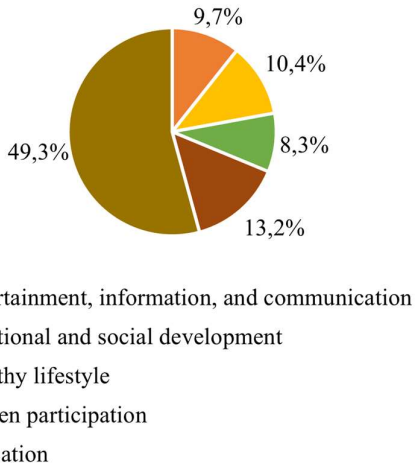

Figure. 2. *Thematic areas linked to the benefits of digital connectivity among children and adolescents*

Research field 2: Temporal range

Figure 3 shows the increase in studies on the benefits of digital connectivity among children and adolescents in recent years (RQ.2). In years 2020 and 2022, we find the highest number of published studies recorded, 17 in each of them.

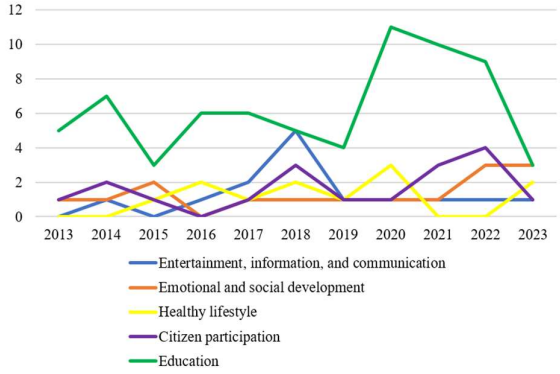

Figure 3. *Number of publications by year and thematic areas*

Research field 3: Research methodology

The research design used by the selected studies (RQ.3) was largely qualitative, accounting for 48% of the cases as observed in the works of Törrönen et al. (2020) and Belloti et al. (2022). On the other hand, a quantitative design was less prevalent, found only in 33.6% of the studies, notably in the research by Liu et al. (2023) and Best et al. (2016). The remaining 18.8% of the studies utilized a mixed-methods approach, as observed in the works by Chong and Pao (2022) and Raghavendra et al. (2018).

With respect to the life cycle stages of the participating children and adolescents (RQ.4), the distribution of the studies is as follows: 12 studies focused on early childhood, from 0 to 5 years old, as indicated in the works by Behnamnia et al. (2020) and Kangas and Sintonen (2014). Childhood, ranging from 6 to 11 years old, was the subject of 31 studies, including those by García-Valcárcel et al. (2016) and Armijo Cabrera and Rojas (2020). Adolescence, covering the age span of 12 to 18 years, was by far the most frequently analyzed stage, featured in 80 studies, such as those by Magis-Weinberg et al. (2022) and Goodyear et al. (2019). Lastly, 21 studies encompassed multiple educational stages, such as the research conducted by Hampshire et al. (2015) and Tomé et al. (2019). As evidenced, adolescence received the most attention among the different life cycle stages.

In 36.1% of the studies, some consideration was given to children and adolescents belonging to groups in vulnerable situations (RQ.5). These groups included

(RQ.6): high ability individuals (Abakumova et al., 2019), those experiencing socioeconomic disadvantage (Kaskazi & Kitzie, 2023), underage females (Gleason, 2018), individuals with functional diversity (Wauters & Dirks, 2017), those from rural areas (Sun & Meng, 2023), those with ethnic-cultural diversity (Rousseau et al., 2019), and intersectional groups or those belonging to multiple categories of vulnerability (Hampshire et al., 2015).

Regarding the geographical distribution of the study sample (RQ.7), research on the benefits of digital connectivity among children and adolescents spanned across 46 countries, as shown in Figure 4. A detailed view of the studies in each country, sorted according to previously established thematic areas, can be accessed online[2]. Most of these studies, 91.4%, were conducted with samples from a single country. Notable exceptions include the studies by Ranieri and Fabbro (2016) and Guerrero-Pico et al. (2018), which involved children and adolescents from seven and eight European countries, respectively. In terms of continent distribution, 53% of the studies featured children and adolescents from European countries (Pouwels et al., 2021; Wauters & Dirks, 2017).

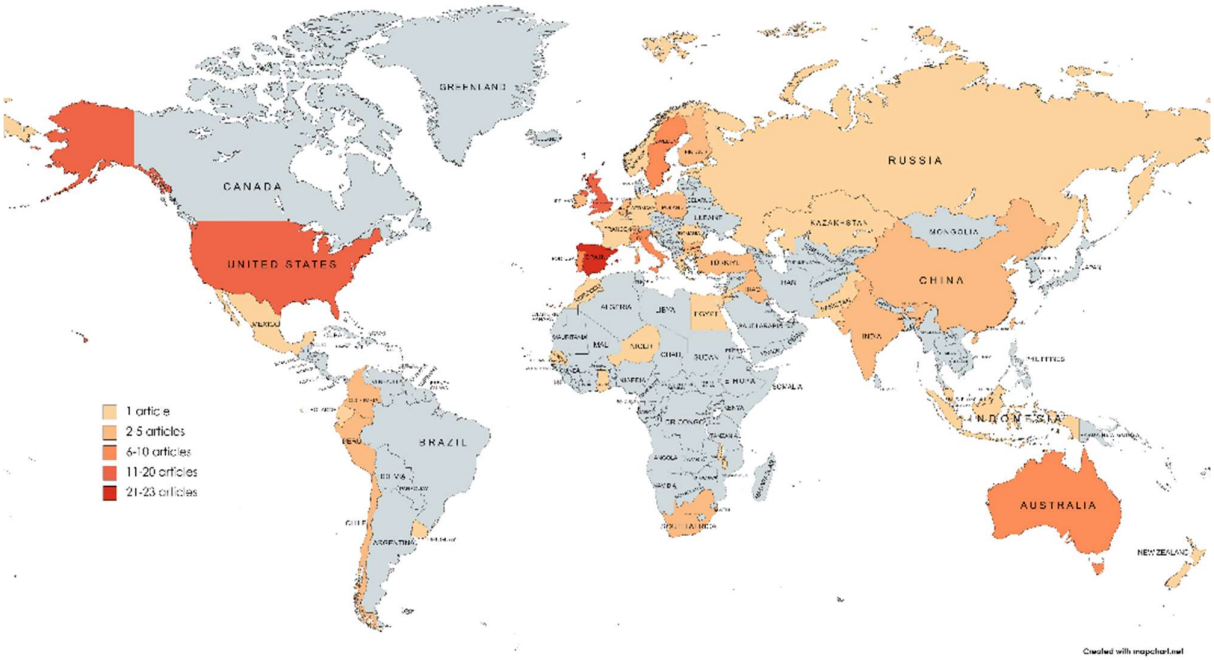

Figure 4. *Geographical distribution of the study sample*

Meanwhile, 14.8% of the studies focused on participants from Asian countries (Rangaswamy & Arora, 2016), 17.3% involved American countries (Tienda et al., 2022; Valdivia, 2016), 6.2% included African countries (Glik et al., 2016; Hampshire et al., 2015), and a mere 8.6% covered Oceania (Fleer 2018; Smith et al., 2015). Within Europe, Spain lead with a total of 23 studies on this subject (Sanz-Arazuri et al., 2018; Valdemoros-San-Emeterio et al., 2018). There were also multi-continent studies, including those incorporating countries from Europe and Oceania (Danby et al., 2018), and America and Europe (Fernández-Padros et al., 2021).

Research field 4: Findings

To provide an answer to RQ.8, the benefits of digital connectivity among children and adolescents are detailed in relation to the five thematic areas previously raised. Table 2 shows the areas and associated topics in which the analyzed research found potential benefits of digital connectivity among children and adolescents.

[2] https://doi.org/10.6084/m9.figshare.27252525.v1

Entertainment, information, and communication. This section consolidates works that demonstrate the competencies and skills fostered through various engagements with technology. Digital games offer the opportunity to stimulate and enhance cognitive demands (Fleer, 2018), cultivate social and cultural competencies derived from participating in playful activities within formal education settings (Bowden, 2019), and provide opportunities for practicing collaborative problem-solving (Danby, 2018). Other benefits include the prospect of informal learning, which has demonstrated its intrinsic motivational value (Sun, 2023). Concurrently, the creation of quintessentially youthful spaces enhances communication and socialization capabilities (Rangaswamy & Arora, 2016; Sanz-Arazuri et al., 2018; Sarwatay, 2023; Valdemoros, 2018). Several studies underscore the media literacy needed for critical management of information and communication (Vasco-González et al., 2020), and the differentiation of skill development according to age (Marsh, 2018) or gender (González-Vidal, 2021).

Table 2. *Thematic areas in which there is evidence of the benefits of digital connectivity among children and adolescents*

Thematic areas	**Topics**
1. Entertainment, information, and communication	– Digital games. – Non-formal education in one's free time. – Access to information. – Spaces for communication.
2. Emotional and social development	– Promotion of social values. – Friendship relationships. – Parental relations.
3. Healthy lifestyle	– Access to information on health and healthy habits. – Digital promotion of physical and mental health (use of physical effort monitoring devices, alcoholism or smoking prevention programs...).
4. Citizen participation	– Citizen, social and solidarity mobilization. – Youth cyberactivism (fight against climate change, feminism). – Visibility of minority cultural expressions.
5. Education	– Improvement of academic performance. – Improvement of learning during online training (pandemic). – Reduction of social and digital exclusion. – Development of digital competence. – Promotion of teamwork skills. – Taking advantage of digital and media literacy programs.

Emotional and social development. Eight out of fifteen papers focused on the relationship between ICT usage and Emotional and social development, delving into how social values are assimilated through online interactions. Notable among these values are honesty, dialogue, tolerance, collaboration, and creativity (Hernández-Prado et al., 2015), and on a personal level, the development of self-determination, self-representation, and the formation of friendships. Additionally, networks facilitate positive emotions (Erreygers, 2017), feelings of belonging (Fabris, 2023), and inclusion (Kaur & Saukko, 2022). It is suggested that internet access offers learning and entertainment resources that have academic implications (Smith et al., 2015). The integration of capabilities responds to factors such as gender, social class, duration and frequency of access, as well as the activities they engage in online (García-Jiménez, 2013), coupled with the child's level of maturity (Shoshani, 2022).

Moreover, four studies probed the potential of messaging applications to expand contact and interaction opportunities (Fitzpatrick & Trninic, 2022), perceptions of closeness (Pouwels, 2021; Rousseau, 2019), and to improve self-presentation skills among children and adolescents (Liu, 2023). Finally, benefits are suggested for couples (Manago, 2019) and parental relationships (Tienda et al, 2022).

Healthy lifestyle. The articles that explore the potential of ICT for health-related purposes, such as the previous section, constituted only a small subset of the research analyzed, and were notable for their diversity. Generally, they were based on the premise that adolescents are critical and vulnerable consumers of health-related content. However, they are not only consumers but can also become creators of content associated to healthy behaviors disseminated through social networks (Goodyear & Armour, 2018). In line with this, Park and Chang (2020) demonstrated that media literacy can be employed to combat smoking among young people.

Hamphire et al. (2015) and Glik et al. (2016) researched the use of the internet among adolescents and young individuals across several African countries. These studies found that even those in rural areas and with limited economic resources strategically utilized their mobile phones to obtain medical information. In Ireland, Best et al. (2016) delved into the same issue, concluding that the larger the online friend circle, the more assistance was sought through social networks, inferring that social networks bring health benefits. Goodyear and Quennerstedt (2019) underscored the potential positive role of social networks as a learning resource related to health. There were also studies focused on the use of health and exercise-related devices and apps, such as Fitbit bands, which are increasingly popular among youth. Content related to healthy habits must coexist with messages of various other types. Still, its accessibility grants younger users' autonomy in accessing health-related information (Goodyear et al., 2018).

Citizen participation. Most of the studies in this section primarily focused on secondary education students. They underscored the potential of social networks to mobilize users and encourage participation in offline activities (Cortés-Ramos et al., 2021; García-Galera, et al., 2014), act as tools for advocating ideals (Rafalow, 2015), and facilitate engagement in social or political organizations (Peart et al., 2023). However, a lower level of involvement among girls as compared to boys was reported (Batista & Simoes, 2022). Belotti et al., (2022) exemplified the use of ICT to mobilize young sectors around combating climate change, while studies such as those by Gleason (2018) and Jackson (2018) explored their potential to challenge gender inequality. Social networks allow disadvantaged youth to participate politically and evaluate information, empowering them and providing them with a voice (Kaskazi & Kitzie, 2021). Furthermore, these networks serve as a tool for expression and a platform for public presence (Campos & Simoes, 2014).

Education. The benefits of connectivity in a children and adolescents' education were evident in more than half of the articles analyzed. Among these, 52.17% concurred that there were improvements in students' academic performance overall and in specific subjects, as indicated by Gil-Quintana and Osuna-Acebo (2020), García-Valcárcel et al. (2016), Goodyear et al. (2019), Lee (2017), Oliveira and Dias (2014), and Santos-Junior et al. (2020). Sjöberg and Brooks (2020) and Vogt and Hollenstein (2021) pinpointed the benefits for the development of teamwork skills, while Danby et al. (2018) highlighted the enhancement of imaginative abilities. Other research, such as Alvarez-Guerrero et al. (2021) and Neagu et al. (2021), underscored the advantages in terms of digital inclusion and accessibility, contributing to the reduction of the digital divide and the fight against digital and social exclusion. Media literacy programs demonstrate, according to Dias-Fonseca and Potter (2016), Martens and Hobbs (2015), and Tuzel and Hobbs (2017), improvements in children and adolescents' education, impacting the development of digital competence and critical thinking.

It is noteworthy that in 73.3% of the articles reporting educational benefits, data was collected through classroom-based educational interventions. Studies in which students generated and produced their own digital content were particularly prominent (Hollenstein et al., 2022; Jackson, 2022; Laakso et al., 2021; Melander & Aarsand, 2020). Lastly, some studies underscored the unique learning opportunities presented by the educational modalities adopted during the pandemic (Panskyi et al., 2021; Yu et al., 2021).

Research field 5: Implications derived from the studies

Entertainment, information, and communication. The fourteen papers categorized under the banner of Entertainment, information, and communication studies underscored the scarcity of research on the myriad benefits of connectivity and digitization for children and adolescents. This dearth is particularly noticeable when examining specific demographic groups, including Aboriginal Australians (Johnson & Oliver, 2014), young children (Edwards & Bird, 2017; Marsh et al., 2018), children with deafness (Wauters & Dirks, 2017), socially disadvantaged youth (Vasco-Gonzalez et al.,

2020), and other vulnerable populations (Valdemoros et al., 2018).

Among various methodologies, the multi-dimensionality of leisure and the opportunities offered by digital spaces to children and adolescents become evident (Sanz-Arazuri et al., 2018). The body of work around entertainment aids in understanding the diverse contextual conditions that characterize media consumption in these age groups. Factors including parental restrictions (Sarwatay & Kaye, 2023), gender (González-Vidal, 2021), and early exposure to a variety of media content (Fleer, 2018) come to the fore. Furthermore, the potential for varied gratifications that users within this age bracket could reap is highlighted (Rangaswamy, 2016).

Emotional and social development. A key contribution from the studies in the field of Emotional and social development lies in their investigation into the role played by digital spaces in shaping interpersonal relationships, primarily among young people and adolescents. Instead of reiterating the standard narrative about the perils of technology, these studies provide evidence of its integration into adolescents' communication with their families and friends (Manago, 2019). They also aggregate evidence on how young individuals exploit digital environments, such as social networks, as developmental spaces for establishing close (Manago, 2019; Rousseau et al., 2019) and high-quality social relationships (Liu, 2023; Pouwels, 2021). Moreover, they demonstrate the role played by these digital platforms in strengthening a sense of belonging (Fabris et al., 2023). It is evident from these studies that social networks serve as platforms for expression and the exchange of values (Hernández et al., 2015). From an educational standpoint, mirroring findings from other exploratory areas, the primary contribution lies in the learning potential offered by digital spaces (Shoshani et al., 2022).

The focus leans towards educating young individuals on managing information, as opposed to merely advocating for risk prevention approaches (Smith et al., 2015). In this vein, enhanced training on social network usage is suggested to boost the social and digital inclusion of youth (Fitzpatrick & Trninic, 2018). Furthermore, it is proposed to design interventions that involve family training in social network usage, facilitating the creation of online spaces that promote value-building (Hernandez et al., 2015). This approach is especially significant in creating positive social spaces that offer affirmative feedback and protection against anxiety (Liu, 2023; Pouwels, 2021). These efforts contribute to the fostering of healthy social and romantic relationships (Store et al., 2022).

Healthy lifestyle. Networks have a significant potential to act as sources of health-related information, provided the communication style is adapted to resonate with children and adolescents (Goodyear & Quennerstedt, 2019). The more we comprehend how young people navigate digital health, the better we can craft relevant pedagogical tools (Goodyear et al., 2018). Similarly, the research reviewed accentuates the need for specialized training for professionals interacting with these audiences on their internet usage (Best et al., 2014; Gui et al., 2023). This is true for both general practices and specific programs, such as those aimed at preventing alcoholism (Torronen et al., 2020). There is a necessity to capitalize on the fact that young individuals utilize new media to learn about health by integrating strategies that tap into this potential (Glik, 2014). Additionally, it is essential to incorporate digital training in schools, to foster skills to discern accurate information and detect falsehoods (Hampshire et al., 2015).

Citizen participation. Media education serves as a powerful strategy to foster appropriate online civic participation among children and adolescents. However, it is important to recognize, as highlighted by Lebrusán et al. (2022), that their access to digital media is mediated by adults and the distinct parenting styles within each family. This scenario complicates the consistent development of digital citizenship. Consequently, it becomes imperative to promote development more uniformly and broadly in this area. Failing to equip all children and adolescents with enhanced digital skills is an unacceptable shortcoming in democratic societies (Wernholm, 2019).

Education. Experts underscore the advantages of connectivity for children's education, advocating for the establishment of training programs from early educational stages (Gabarda et al., 2017; Tarango-Ortiz et al., 2014), and for teachers (Hollestein et al., 2022). The use of technology as a tool for enhancing learning outcomes is emphasized (Chou, 2017; Jalal et al., 2019). Additionally, they recommend a re-definition of the meaning of the participatory culture cultivated in adolescents' productive practices (Guerrero-Pico et al., 2018).

In terms of implications for educational practice, understanding adolescents' daily interactions with internet devices can provide information for the

development of educational strategies (González-Vidal, 2021). In this regard, studies tend to emphasize the significance of designing educational interventions for children and young individuals, enabling them to use digital spaces, particularly social networks, responsibly (Sanz-Arazuri et al., 2018). These kinds of programs contribute towards enhancing trust, promoting prevention, encouraging participation, and fostering media literacy in interactions. Moreover, it is acknowledged that young people appreciate the use of "mobile learning" environments in formal education settings (Johnson & Oliver, 2014).

Research field 6: Prospective research trajectories

Entertainment, information, and communication. Much of the existing research within the realm of entertainment does not suggest prospective avenues for future investigations. A minority of these studies, however, do carve out new paths for exploration. Notably, González-Vidal (2021) posits his research as an initial steppingstone towards further exploration of how children utilize digital spaces within the proposed interpretive framework (Edwards & Bird, 2017). Furthermore, Vasco-González et al. (2020) advocate for a more in-depth examination of the same group, especially considering the dearth of studies focusing on a specific minority. This situation clearly highlights the existing gap in the academic literature dedicated to probing this field.

Emotional and social development. There are numerous prospective research trajectories related to the Emotional and social development of children that remain unexplored. Existing studies highlight the importance of undertaking longitudinal research to delve deeper into how children interact with technology. Moreover, they advocate for the diversification of techniques (Manago, 2019) and indicators (Liu, 2023), along with the integration of varied methodologies (Rousseau et al., 2019) to uncover factors (Fabris et al., 2023) that facilitate the comprehensive exploration of these relationships.

The intent is to ensure that future research provides a platform for designing strategies to manage potential risks for young people (García-Jiménez, 2013). In addition, it should contribute towards dismantling obstacles and creating spaces for inclusion (Fitzpatrick & Trninic, 2018). This approach underlines the goal of fostering the development of positive, healthy, and supportive friendships (Pouwels, 2021) as well as romantic relationships (Tienda et al., 2022) in digital environments.

Healthy lifestyle. Several studies underscore the necessity to assess the impact of various devices used to access health information (Park et al., 2017). Moreover, they emphasize the importance of evaluating how children and adolescents leverage social networks to promote healthy habits. Alongside this, there is a clear demand to design educational supports to augment these efforts (Goodyear & Quennerstedt, 2019).

Citizen participation. In this domain, it is once again evident that there is a dearth of scientific literature (Cortés-Ramos, 2021). As potential research directions, a suggestion is made to investigate the diverse ways in which young individuals practice digital citizenship (Batista & Simoes, 2022), and to further explore the means of nurturing digital citizenship within classroom settings. An examination of factors that either support or inhibit the development of participation is also encouraged (Peart et al., 2022). Furthermore, scholars are prompted to undertake cross-national comparative studies on youth digital activism (Belotti et al., 2022). Continuing to study the potential of social networks in empowering marginalized youth also stands as an important avenue for future research (Kaskazi & Kitzie, 2021).

Education. Given the learning opportunities found in the research reviewed, scholars are prompted to further examine areas such as the development of educational practices enhanced by digital resources, the collaborative design of online games by students from early childhood to adolescence, and online assessment methods (Laakso et al., 2021; Lee, 2017; Romero-Martínez & Vela-Barranco, 2014), with the aim to optimize their application. In a similar vein, more research targeted at teachers and administrative teams is recommended to supplement studies conducted with students (García-Martín & García-Martín, 2022). These endeavors will significantly contribute towards reducing the gender digital divide and promote the use of technology by students with varying functional abilities (Álvarez-Guerrero et al., 2021; Wong & Kemp, 2018). These are among the challenges researchers have put forward for future exploration.

DISCUSSION AND CONCLUSIONS

This paper provides a systematic review of the literature on the benefits of digital connectivity among children and adolescents, based on the analysis of 128

studies published in the last decade. The preliminary Research fields underscore the primary thematic areas associated with the advantages and opportunities afforded by digital connectivity to children and adolescents. From this exploration, we have distilled five pivotal domains: (1) Entertainment, information, and communication; (2) Emotional and social development; (3) Healthy lifestyle; (4) Citizen participation; and (5) education. This aligns with current policy discussions, which concentrate not solely on risk prevention and the protection of children and adolescents in the digital domain, but also on the pursuit of opportunities it presents (European Commission, 2021; UNESCO, 2021). Within this literature review, studies related to education and training were the most abundant. This domain recognizes that digital connectivity imparts significant educational value by granting access to information, simplifying online learning, stimulating collaboration and communication, offering interactive resources, personalizing learning experiences, and introducing global opportunities for students (Brites & Castro, 2022).

Regarding the second Research field, the results indicate a surge in studies exploring the benefits of digital connectivity for children and adolescents, particularly those centered on educational opportunities and training, during the years of the COVID-19 pandemic. This finding is consistent, given the shift from physical classrooms to online learning environments necessitated by the closure of educational institutions (Marimon-Martí et al., 2022). Consequently, the need for an improved understanding of digital connectivity and its impact on education has become evident, thereby expanding the scope of possibilities within this research domain.

The third Research field categorizes the methodologies used in studies on this topic and delineates the characteristics of the analyzed groups. The findings underscore the prominence of qualitative research designs and studies involving adolescent participants. Vulnerable groups were featured in one-third of these cases. This outcome deviates from the results presented by Miller et al. (2017) in their review on the usage of technologies by children and adolescents. They concluded that the dominant methodology comprised mixed designs, surveys for data collection, and homogenous samples. Nonetheless, the outcomes of this review align with those by Livingstone et al. (2017), which suggested a significant interest from European countries in studies on children' digital connectivity.

As for the fourth Research field, which aimed to elucidate the benefits arising from the use of ICT in each subject area, this review aligns with the observations from Mantilla and Edwards (2019). They proposed that digital connectivity facilitates social relationships, digital play, and improvements in the educational process during childhood and adolescence. However, this study extends the horizon of possibilities offered by connectivity by casting a broader glance at leisure activities in the digital media. This includes engagement in entertainment proposals, information searches, or communication. The study also identifies the promotion of healthy habits and civic participation in digital media as new areas for exploring the opportunities provided by connectivity. Predominantly, most of the analyzed research revealed benefits for the learning and education of children and adolescents, ranging from improvements in academic performance and digital competence, to the development of teamwork-related skills such as communication and problem-solving. It also discusses the leveraging of new opportunities to bridge the digital divide and counter limitations that would otherwise result in greater social exclusion. These findings align with the insights of Akçayır and Akçayır (2017), Andrade-Vargas et al. (2021), Gibson et al. (2017), and Hou et al. (2015). It is noteworthy to mention the benefits derived from the implementation of specific media literacy programs. According to Aguaded et al. (2022), the development of media competence is particularly pertinent at these ages.

The fifth and sixth Research fields dissect the implications and future research trajectories of the studies collected under each thematic area. Prominent among these are: (1) analyzing parental restrictions on digital leisure activities, early exposure to media content, and the gratifications children and adolescents derive from digital entertainment activities; (2) recognizing the importance of promoting values to nurture constructive, healthy, and close-knit social relationships in digital spaces; (3) pursuing reliable information on healthy habits and recognizing the necessity to devise pedagogical strategies concerning digital health; (4) understanding digital cultures wherein users can share, communicate, and actively participate in various issues and problems of collective interest; and, (5) implementing media literacy training plans from an early age to augment the benefits rendered by digital connectivity to children and adolescents.

In conclusion, it is crucial to acknowledge the limitations of this research, which considered two databases and open-access articles in two languages. Future research could benefit from incorporating additional indexing systems to enrich the search for articles pertinent to this topic. Furthermore, the selection was confined to articles involving children under eighteen years of age. As a suggestion, future studies could adopt a comparative and complementary lens by incorporating some of the children's most important socialization agents, such as families or teachers (as proposed by Larrañaga et al., 2023), or analyzing the role of the age and genre when measuring the effectiveness of digital connectivity. Additional suggestions in examining the benefits and opportunities of ICT are to extend the age range of study participants to include young adults, and review the balance between scientific literature underlining positive uses and those papers more focused on the potential negative consequences of their implementation. All these approaches would enable a contrasting perspective on the thematic areas proposed in this study. In so doing, it would be possible for stakeholders and institutions to take evidence-based decisions on their media and digital policies.

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APPENDIX

List of references examined in the systematic literature review focused on opportunities and constructive usage of Information and Communication Technology (ICT) among Children and Adolescents, organized by thematic areas.

1. Entertainment, information, and communication

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